

What is claimed is:

1. An electrostatically shielded radio frequency (ESRF) plasma apparatus comprising:
 - a process chamber enclosing a plasma area;
 - a resonator assembly surrounding said plasma area, said resonator assembly comprising a coil provided within said resonator assembly;
 - a housing assembly coupled to said process chamber and surrounding said resonator assembly; and
 - a clamping plate coupled to said process chamber and said housing assembly, said clamping plate securing said resonator assembly to at least said process chamber;wherein at least one of said resonator assembly, said housing assembly, and said clamping plate can be removed while maintaining said plasma area in an evacuated state.
2. The ESRF plasma apparatus as claimed in claim 1, wherein walls of said resonator assembly are constructed of sheet metal.
3. The ESRF plasma apparatus as claimed in claim 2, wherein an upper wall and a lower wall are provided with a mating surface for coupling said upper wall and said lower wall to an outer wall and an inner wall.
4. The ESRF plasma apparatus as claimed in claim 3, wherein said upper wall and said lower wall are coupled to said inner wall and said outer wall with at least one assembly clip.
5. The ESRF plasma apparatus as claimed in claim 1, wherein said housing assembly is coupled to said process chamber using at least one standard ISO (International Standards Organization) centering ring assembly.
6. The ESRF plasma apparatus as claimed in claim 3, wherein said upper wall and said lower wall are coupled to said inner wall and said outer wall by brazing.

7. The ESRF plasma apparatus as claimed in claim 3, wherein said upper wall and said lower wall are coupled to said inner wall and said outer wall with a plurality of rivets.

8. The ESRF plasma apparatus as claimed in claim 1, wherein said housing assembly is coupled to said clamping plate using at least one standard ISO (International Standards Organization) centering ring assembly.

9. The ESRF plasma apparatus as claimed in claim 1, wherein said clamping plate is coupled to said process chamber using at least one standard ISO (International Standards Organization) centering ring assembly.

10. The ESRF plasma apparatus as claimed in claim 1, wherein said resonator assembly comprises an inner wall configured as an electrostatic shield with at least one slot.

11. The ESRF plasma apparatus as claimed in claim 1, further comprising a cooling chamber in which said resonator assembly is fluidly cooled.

12. An electrostatically shielded radio frequency (ESRF) plasma source comprising:

a process chamber adapter plate configured to mount said ESRF source to a process chamber;

a process tube coupled to said plate, said process tube enclosing a plasma area;

an inject assembly coupled to said process tube;

a resonator assembly surrounding said process tube, said resonator assembly comprising a coil provided within said resonator assembly;

a housing assembly coupled to said process chamber adapter plate and surrounding said resonator assembly; and

a clamping plate coupled to said inject assembly and said housing assembly, said clamping plate securing said resonator assembly to said process chamber adapter plate;

wherein at least one of said resonator assembly, said housing assembly, and said clamping plate can be removed while maintaining said plasma area in an evacuated state.

13. The ESRF plasma source as claimed in claim 12, wherein walls of said resonator assembly are constructed of sheet metal.

14. The ESRF plasma source as claimed in claim 13, said resonator assembly comprising an upper wall, a lower wall, an outer wall and an inner wall, wherein said upper wall and said lower wall are provided with a mating surface for coupling said upper wall and said lower wall to said outer wall and said inner wall.

15. The ESRF plasma source as claimed in claim 14, wherein said upper wall and said lower wall are coupled to said inner wall and said outer wall with at least one assembly clip.

16. The ESRF plasma source as claimed in claim 12, wherein said housing assembly is coupled to said process chamber adapter plate using at least one standard ISO (International Standards Organization) centering ring assembly.

17. The ESRF plasma apparatus as claimed in claim 12, wherein said clamping plate is coupled to said inject assembly using at least one standard ISO (International Standards Organization) centering ring assembly.

18. The ESRF plasma source as claimed in claim 14, wherein said upper wall and said lower wall are coupled to said inner wall and said outer wall by brazing.

19. The ESRF plasma source as claimed in claim 14, wherein said upper wall and said lower wall are coupled to said inner wall and said outer wall with a plurality of rivets.

20. The ESRF plasma source as claimed in claim 12, wherein said housing assembly is coupled to said clamping plate using at least one standard ISO (International Standards Organization) centering ring assembly.

21. The ESRF plasma source as claimed in claim 12, wherein the geometry of said resonator assembly can be altered while maintaining said plasma area in an evacuated state.

22. The ESRF plasma source as claimed in claim 19, wherein said resonator assembly comprises a cooling chamber in which said resonator assembly is fluidly cooled.

23. A method for manufacturing a resonator assembly for an electrostatically shielded radio frequency (ESRF) plasma source, said method comprising.

constructing an outer portion and an inner portion of said resonator assembly by rolling sheet metal into cylinders with the appropriate diameter and height;

constructing an upper portion and a lower portion of said resonator assembly by fabricating sheet metal into discs with an appropriate outer diameter and inner diameter;

producing at least one flange on said upper portion and said lower portion to mate said upper portion and said lower portion to said inner portion and said outer portion; and

coupling said upper portion and said lower portion to said outer portion and said inner portion.

24. The method for manufacturing a resonator assembly as claimed in claim 23, wherein said coupling is performed with at least one assembly clip.

25. The method for manufacturing a resonator assembly as claimed in claim 23, wherein said coupling is performed with a plurality of rivets.

26. The method for manufacturing a resonator assembly as claimed in claim 23, wherein said coupling is performed by brazing said upper portion and said lower portion to said outer portion and said inner portion.